

**REMARKS**

This is a response to the Office Action dated June 29, 2006.

**I. SUMMARY OF OFFICE ACTION**

In the Office Action, the Examiner rejected claims 1, 11, and 12 under 35 U.S.C. § 102(b) based on the view that the claims are anticipated by Maerki et al. (6097522). The Examiner also rejected claims 2, 3, 9, and 10 under 35 U.S.C. § 103(a) based on the view that the claims are unpatentable over Maerki et al. The Examiner additionally rejected claims 10, 13, 19, and 34 under 35 U.S.C. § 112 second paragraph, but stated that claims 13, 19, and 34 would be allowable if rewritten or amended to overcome the rejection, and Claim 13 being further rewritten in independent form.

Further, in the Office Action, Claims 4-8, 14-18, 20-33, and 35-39 were objected to as being dependent upon rejected base claims. Importantly, even though Claims 4-8, 14-18, 20-33, and 35-39 were objected to as being dependent upon a rejected base claim, the Examiner indicated that those claims would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

**II. APPLICANT'S RESPONSE**

**A. CLAIM REJECTIONS UNDER 35 U.S.C. § 102(b)**

**Claim 1**

In the Office Action, Claim 1 was rejected under 35 U.S.C. § 102(b) based on the view that Maerki et al. anticipates Claim 1. In response to Examiner's rejection Applicant has amended independent Claim 1 to incorporate the substance of dependent Claim 4. The method for facilitating airborne free space optical communications of the present invention, as reflected in amended base Claim 1, features "tightening a field of regard for each successive tier within the cascaded three-tier steering element architecture to allow for finer steering resolution."

In particular, the present invention as reflected in amended independent Claim 1 is directed to a method for facilitating airborne free space optical communications between an airborne host platform and a link platform using a cascaded three-tier steering element architecture. The coarse, fine, and ultrafine steering element each have a field of regard. The

field of regard is tightened between the coarse and fine steering element and further tightened between the fine and ultrafine steering element. The tightening of the field of regard allows for finer steering resolution. As the field of regard is tightened, the bandwidth is increased. Maerki et al. does not disclose the cascaded three-tier steering element architecture of Applicant's invention with a field of regard for each tier in which the field of regard is tightened for each successive tier within the steering element architecture.

For the foregoing reasons, Applicant respectfully submits that amended base Claim 1 is now allowable. Applicant has canceled Claim 4 without prejudice. Dependent Claims 5-8 are further limitations of the amended base Claim 1. Insofar as the amended base Claim 1 is believed to be allowable, its dependent Claims 5-8 are also believed to be allowable. Claim 13 has been amended to overcome Examiner's rejection. Therefore, dependent Claims 14-18 are believed to be allowable. Furthermore, the objection to Claim 17 for an informality has been corrected. Accordingly, the Examiner's objections of Claims 4-8 and 14-18 have been overcome. For the foregoing reasons, Applicant respectfully submits that the invention recited in Claims 5-8 and 13-18 are in condition for allowance.

Claims 11 and 12

In the Office Action, Claims 11 and 12 were rejected under 35 U.S.C. § 102(b) based on the view that Maerki et al. anticipates Claims 11 and 12. In response to Examiner's rejection, Applicant has canceled Claims 11 and 12 without prejudice.

**B. CLAIM REJECTIONS UNDER 35 U.S.C. § 103(a)**

Claims 2 and 3

In the Office Action, Claims 2 and 3 were rejected under 35 U.S.C. §103(a) based on the view that the claims are obvious in light of the Maerki et al. reference. The Examiner stated, "a first specified range of measured units of about 200-500 microrad and a second specified range of measured units of about 100 microrad is not a disclosure of criticality for the claimed ranges. Absent any disclosure of criticality, the microrad range limitations of a larger and small divergence would have been an obvious engineering design choice." Applicant respectfully disagrees with Examiner's obviousness rejection of claims 2 and 3. The first and second specified range of measured units is a disclosure of criticality because it corresponds to jitter

specification. It is a typical requirement for a pointer-tracker subsystem in FSO communications systems must point to within 1/10 of the beam divergence. Therefore, a 100-microrad range limitation for a second specified range has a jitter specification of 10 microrad. A jitter specification of 10 microrad is beyond the capability of most airborne pointer-tracker subsystems. The limited range may be achieved by using dynamic focusing of the ultrafine steering adaptive-optical element. Maerki et al. fails to disclose a method of obtaining such a limited jitter specification of 10 microrad. Furthermore, Applicant's invention contemplates the combination of certain elements of the invention to achieve a limited specified range.

For the foregoing reasons, Applicant respectfully submits that the invention recited in Claims 2 and 3 are in condition for allowance.

Claims 9 and 10

In the Office Action, Claims 9 and 10 were rejected under 35 U.S.C. §103(a) based on the view that the claims are obvious in light of the Maerki et al. reference. The Examiner noted that, "it would have been obvious to one of ordinary skill in the art at the time of the invention to use a deformable mirror for the focusing and defocusing in Maerki, to provide the benefit of electro-mechanical beam focusing/defocusing. (Office Action, pg. 5). Applicant respectfully disagrees with Examiners obviousness conclusion in light of the Maerki et al. reference. An embodiment of Applicant's invention teaches link acquisition involving dynamic focusing and defocusing of the ultrafine steering adaptive-optical element. The beam is slightly defocused to facilitate a larger angle of divergence. Once the beacon from the link partner is witnessed by the fast track sensor, the beam is focused down by the deformable mirror to a narrower angle of divergence, providing more signal to the link partner, and establishing the link. The host terminal upon seeing the beacon of the link partner will, via dynamic focusing, collapse the divergence of the transmittal beam down to within 100  $\mu$ rad. Thus, using a deformable mirror for focusing and defocusing is not obvious when it is in combination with the components of Applicant's invention, because collapsing the divergence of the transmittal beam to within 100  $\mu$ rad places a new demand on pointing accuracy. Therefore, using a deformable mirror to collapse the divergence of the transmittal beam to within 100  $\mu$ rad is not obvious because it sets a new demand on pointing accuracy that has not been widely achieved. Furthermore, this feature obviates the need for mechanically adjustable optics in the acquisition step. Thus, the

deformable mirror simplifies the system and at the same time, it achieves a more restrictive demand on pointing accuracy. At best, Maerki et al. is understood to disclose that focusing the beam includes defocusing the beam. Maerki et al. does not disclose collapsing the divergence beam to within 100  $\mu$ rad or setting a new demand on pointing accuracy.

For the foregoing reasons, Applicant respectfully submits that the invention recited in Claims 9 and 10 are in condition for allowance.

**C. CLAIM REJECTIONS UNDER 35 U.S.C. § 112, SECOND PARAGRAPH**

**Claim 19**

In the Office Action, Claim 19 was rejected under 35 U.S.C. § 112 as being incomplete for omitting essential structural cooperative relationships between the claimed elements of the optical head. In response, Applicant has amended Claim 19 to recite cooperative relationships between the claimed elements that the optical head comprises. In this respect, Applicant respectfully submits that the amended base Claim 19 is now believed to be in condition for allowance. Dependent Claims 20-33 and 35-39 are further limitations of the amended base Claim 19. Insofar as the amended base Claim 19 is believed to be allowable, its dependent Claims 20-33 and 35-39 are also believed to be allowable. Furthermore, Claim 34 has been amended and is believed to be in condition for allowance and the objections to Claim 22, 31, and 33 for informalities have been corrected and the objections overcome.

**D. NEW INDEPENDENT CLAIM**

**Claim 40**

Applicant has added independent Claim 40. Applicant respectfully submits that new base Claim 40 is allowable.

**III. CONCLUSION**

For the foregoing reasons, Applicant respectfully submits that all the stated grounds of rejection have been overcome, and that Claims 1-3, 5-10, and 13-40 are in condition for allowance. An early notice of allowance is therefore respectfully requested.

Application No.: 10/675,066  
Attorney Docket: NORTE-509A

Should the Examiner have any suggestions for expediting allowance of the application, the Examiner is invited to contact the Applicant's representative at the telephone number listed below.

If any additional fee is required, please charge deposit account number 19-4330.

Respectfully submitted,

Date: July 24, 2006 By:



Bruce B. Brunda  
Registration No. 28,497  
STETINA BRUNDA GARRED & BRUCKER  
75 Enterprise, Suite 250  
Aliso Viejo, California 92656  
Telephone: (949) 855-1246  
Fax: (949) 855-6371

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